

volume exceeds the second volume by a fraction, which may be a predetermined fraction, of the first incremental volume. A first incremental volume of fluid from the second source is delivered to the destination, and delivery of the first volume of fluid to the destination is resumed.

[0011] In accordance with related embodiments, the first incremental volume of fluid may be less than one quarter of the target volume. In accordance with further related embodiments, the desired ratio may be 1:1 and the predetermined fraction may be one half. Delivering the first and second volumes of fluid to a destination may include delivering the first and second volumes of fluid parenterally to a human subject. Similarly, delivering the first volume and second volumes of fluid to a destination may include delivering the first and second volumes of fluid to a fluid reservoir and/or container, and such a container may be a heating bag and/or a pump chamber.

[0012] In accordance with other related embodiments, the method may include determining that approximately the target volume of fluid has been delivered to the destination and measuring the volume of fluid delivered to the destination from the first source and the volume of fluid delivered to the destination from the second source. A third volume of fluid from the source that has delivered a smaller volume of fluid to the destination may then be delivered in increments each having approximately a second incremental volume, the second incremental volume being less than the first incremental volume, such that the volume of fluid delivered to the destination from the first source and the volume of fluid delivered from the second source are in approximately the desired ratio. The sum of the first volume and the second volume may be approximately equal to the target volume minus a finish volume, and the second incremental volume may be less than the finish volume. In one related embodiment, the second incremental volume is less than one third the finish volume.

[0013] In accordance with another embodiment of the invention, a system for simultaneously delivering a target volume of fluid from two sources in a desired ratio to a common destination includes a first fluid source, a second fluid source, and a fluid control module. The fluid control module delivers a first volume of fluid from the first fluid source and a second volume of fluid from the second fluid source to the destination in increments each having approximately a first incremental volume, the first incremental volume being substantially less than the target volume. The fluid control module also measures the volume of fluid delivered to the destination from the first source and the volume of fluid delivered to the destination from the second source, suspends delivery of the first volume of fluid to the destination when the first volume exceeds the second volume by a fraction, which may be a predetermined fraction, of the first incremental volume, and resumes delivery of the first volume of fluid to the destination. The system also includes a valve arrangement for controlling fluid communication between the destination and first and second fluid sources and a controller for determining the first and second volumes of fluid, the first incremental volume of fluid, and for controlling the valve arrangement and the fluid control module.

[0014] In accordance with related embodiments, the first incremental volume may be less than one quarter of the target volume. Additionally, the desired ratio may be 1:1 and the predetermined fraction may be approximately one half.

In accordance with yet further related embodiments, the fluid control module may deliver the first and second volumes of fluid to a human subject, and the fluid control module may deliver the first and second volumes of fluid parenterally. Similarly, the fluid control module may deliver the first and second volumes of fluid to a fluid reservoir and/or to a container. Such a container may be a heating bag and/or a pump chamber. The controller may also determine that approximately the target volume minus a finish volume of fluid has been delivered to the destination. Further, the fluid control module may measure the volume of fluid delivered to the destination from the first source and the volume of fluid delivered to the destination from the second source and deliver a third volume of fluid from the source that has delivered a smaller volume of fluid to the destination. The third volume of fluid may be delivered in increments each having approximately a second incremental volume. The second incremental volume may be less than the first incremental volume, such that the volume of fluid delivered to the destination from the first source and the volume of fluid delivered from the second source are in approximately the desired ratio. Further, the sum of the first and the second volumes may be approximately equal to the target volume minus a finish volume and the second incremental volume may be less than the finish volume. For example, the second incremental volume may be less than one third the finish volume.

[0015] In accordance with a further embodiment of the invention, a system for delivering a target volume of fluid to a destination includes fluid delivery means for delivering a first volume of fluid to the destination in one or more first incremental volumes, the first volume of fluid being less than the target volume, and delivering a second volume of fluid to the destination in one or more second incremental volumes, the second incremental volume being less than the first incremental volume. The system also includes measuring means for measuring the volume of fluid delivered to the destination and control means for controlling the fluid delivery means.

[0016] In accordance with another embodiment of the invention, a system for simultaneously delivering a target volume of fluid from two sources in a desired ratio to a common destination includes a first fluid source and a second fluid source. Fluid delivery means delivers a first volume of fluid from the first fluid source and a second volume of fluid from the second fluid source to the destination in one or more first incremental volumes, the first incremental volume being substantially less than the target volume. Measuring means measures the volume of fluid delivered to the destination from the first source and the volume of fluid delivered to the destination from the second source. Control means suspends delivery of the first volume of fluid to the destination when the first volume exceeds the desired ratio with respect to the second volume by a fraction, which may be a predetermined fraction, of the first incremental volume and then resumes delivery of the first volume of fluid to the destination.

[0017] In accordance with a further embodiment of the invention, a system for simultaneously delivering a target volume of fluid from two sources in a desired ratio to a common destination includes a first fluid source and a second fluid source. The system also includes fluid delivery means for delivering a first volume of fluid from the first fluid source and a second volume of fluid from the second